Modular Composite Sill for Threshold

CROSS REFERENCES

[0001] This application is a continuation-in-part of co-pending U.S. Application Serial No. 10/411,535 filed April 10, 2003.

TECHNICAL FIELD OF THE INVENTION

[0002] The present invention relates generally to door frames and, more particularly, to a modular sill assembly which may be vertically adjusted and adapted for a variety of doorway configurations.

BACKGROUND OF THE INVENTION

[0003] In a standard threshold assembly, a sloping sill is attached to a base. The sill is oriented on the exterior of the door frame. A trim piece or nosing is generally attached to the opposite side of the base facing the interior of the door frame. Between the sill and trim piece, a riser or threshold cap is attached to the top of the base. The riser is positioned to underlie the door when it is in a closed position and form a seal with the bottom of the door.

[0004] Several methods of attaching the riser to the base exist in the prior art. In particular, a number of these prior art designs provide for adjustment in the height of the riser relative to the base. These prior art designs tend to incorporate mechanisms, for example, corresponding nut and screw assemblies, that are fixed in position relative to the length of the base.

[0005] The manufacture of the individual pieces comprising a sill assembly and the method of attaching the riser to the base have presented numerous design issues to the millwork industry. One particularly troublesome issue is the fact that, doorways, come in a large variety of configurations. For instance, a door frame may accommodate a door

and a non-moving sidelight or a pair of opposing ("french") doors and an astragal, which may or may not be attached to one of the opposing doors. Current sill designs can be used in a limited number of configurations and provide little flexibility in the available configurations. While manufacturers have attempted to design threshold assemblies that are adaptive in some aspects, none have produced a design that provides sufficient adaptability. As mentioned above, the prior art designs generally utilize attachment mechanisms that are fixed in position relative to the length of the base.

[0006] Furthermore, these prior art designs utilize a large amount of custom hardware, particularly in their attachment mechanisms, such as specialized shoulder screws and push nuts. This custom hardware increases the cost of the sill assembly and requires that manufacturers stock a large amount of custom pieces for which they have no other use.

[0007] An improved sill assembly would preferably have a modular design that is capable of ready adaptation to various doorway configurations, while requiring a minimal amount of custom hardware for assembly.

[0008] The present invention is directed to overcoming one or more of the problems set forth above.

SUMMARY OF THE INVENTION

[0009] An aspect of the present invention is to provide a modular sill assembly that is easily adapted to a variety of different doorway configurations.

[0010] Another aspect of the present invention is to provide a modular sill assembly that utilizes a means of connecting a riser to a substrate that is easily adaptable to whatever length and arrangement is required by a particular doorway design.

[0011] Yet another aspect of the present invention is to provide a modular sill assembly that utilizes a minimal number of custom parts for assembly, thereby enhancing interchangability of parts in the system.

[0012] Another aspect of the present invention is to provide a modular sill assembly with a height-adjustable riser that can be adjusted without the need for a visible adjustment mechanism.

[0013] In accordance with the above aspects of the invention, there is provided an adjustable threshold assembly that includes an elongated substrate base composed of a molded composite material; a sill plate connected with the substrate base; a riser having a top and two downwardly-extending legs defining an interior of the riser, said interior of the riser having a first flange and a second flange angling downward and toward one another; and means for supporting the riser on the substrate base including an adjusting screw and a corresponding T-nut, said adjusting screw having a head adjacent the substrate base and said T-nut slideably supported by the first and second flanges and wherein the riser is supported by the substrate base by threading the adjusting screw into the T-nut.

[0014] In another embodiment, the adjusting screw is provided with an extended head that extends beyond the legs of the riser, thereby enabling adjustment of the screw by direct engagement and turning of the extended screw head.

[0015] These aspects are merely illustrative of the innumerable aspects associated with the present invention and should not be deemed as limiting in any manner. These and other aspects, features and advantages of the present invention will become apparent from the following detailed description when taken in conjunction with the referenced drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Reference is now made to the drawings which illustrate the best known mode of carrying out the invention and wherein the same reference numerals indicate the same or similar parts throughout the several views.

[0017] Fig. 1 is a perspective view of a doorway incorporating a sill assembly according to an embodiment of the present invention.

[0018] Fig. 2 is a cross-sectional view of the sill assembly of Fig. 1 taken along line Z-Z.

[0019] Fig. 3 is a partial section perspective view of an embodiment of a sill assembly illustrating a T-nut/screw fastening assembly.

[0020] Fig. 4 is a cutaway view of an embodiment of a sill assembly

[0021] Fig. 5 is a perspective view of an embodiment of a sill assembly for a doorway including an active door and sidelight or non-active door.

[0022] Fig. 6 is a cross-sectional view of another embodiment of a sill assembly incorporating an alternate riser support arrangement.

[0023] Fig. 7 is a cross-sectional view of yet another embodiment of a sill assembly incorporating a second alternate riser support arrangement.

[0024] Fig. 8 is a cross-sectional view of an alternate embodiment of a sill assembly incorporating the riser support arrangement of Fig. 6.

[0025] Fig. 9 is a cross-sectional view of yet another embodiment of a sill assembly incorporating the riser support arrangement of Fig. 6.

DETAILED DESCRIPTION

[0026] Figs. 1-4 illustrate a sill assembly shown generally at 10 including a substrate 12, a sill 14, a riser 16, and a trim piece 18. Fig. 1 illustrates a sill assembly 10 of this design installed in a door frame 20 between the door jambs.

[0027] The substrate 12 shown in Figs. 1-4 is generally rectangular in shape with a number of grooves formed therein. In the embodiment shown, the top surface 26 of the substrate 12 includes a first sill groove 28. The bottom surface 30 of the substrate 12 includes a second sill groove 32. The first and second sill grooves 28, 32 aid in securing the sill 14 to the substrate 12. The substrate 12 is also provided with a first trim groove 34 in the top surface 26 and a second trim groove 36 in the bottom surface 30. These

grooves aid in securing the trim piece 18 to the substrate 12. The top surface 26 of the substrate 12 also includes a T-shaped slot 38 that extends along the entire length of the substrate 12 and opens to the top surface 26. In a preferred embodiment, the substrate 12 is manufactured from a composite material that is processed to form the desired cross-section for the substrate.

[0028] The riser 16 includes a top surface 40 and first 42 and second 44 legs extending generally downward from the top surface. The top surface 40, first leg 42 and second leg 44 define an interior 46 of the riser 16. A first flange 48 and a second flange 50 are located within the interior 46 of the riser 16. In the embodiment shown, the first flange 48 emanates from the first leg 42 and the second flange 50 is supported by the top surface 40 of the riser. However, the flanges 48, 50 may be supported by the first and second legs, respectively, the top surface 40, or the top surface 40 and second leg 44, respectively. Advantageously, the first and second flanges 48, 50 angle downward and toward one another forming a generally V-shaped structure with an opening 60 at the vertex of the flanges. An extension 52, 54 is located at the end of each flange 48, 50. Preferably, the extensions 52, 54 are made of a softer durometer material than the rest of the riser 16, such as a plastic material. The riser 16 itself is preferably made of an extruded plastic material, although a number of extrudable materials are suitable. In a preferred embodiment, the extensions 52, 54 are co-extruded with the rest of the riser. The riser 16 also includes a sealing leg 56 extending out and downward from the top surface 40 of the riser 16. The sealing leg includes a sealing extension 58 that extends into the space between the sealing leg 56 and first leg 42. The sealing leg 56 and extension 58 engage the sill in manner described below in order to form a weather seal for the sill assembly.

[0029] During installation, the riser 16 is positioned on top of the substrate 12 with the opening 60 at the vertex of the flanges located generally above the T-shaped slot 38. A T-nut 62 having a flange 64 is inserted into the T-shaped slot 38 with first and second

lateral extensions 66, 68 of the slot accommodating the flange 64. A corresponding screw 70 is inserted between the flanges 48, 50, with the flanges supporting the head of the screw 70 and the threaded portion of the screw extending through the opening 60 between the flanges. The extensions 52, 54 of the flanges engage the screw 70 to restrict both vertical and lateral movement of the screw, thereby eliminating any need for a push nut or similar structure to secure the screw. This, in turn, eliminates the need to use special fasteners, for example, screws having shoulders designed to accommodate push nuts. Any standard screw of suitable length may be used instead. In order to secure the riser 16 to the substrate 12, the screw 70 is inserted into the T-nut 62, and the screw 70 is tightened. The height of the riser 16 relative to the substrate 12 is adjustable by varying the extent to which the screw 70 is tightened into the T-nut 62. The riser 16 is preferably provided with a number of access holes 72 in the top surface 40 through which a screwdriver may be inserted in order to tighten the screw 70. Caps 73 are provided to cover the access holes 72 and present a finished appearance. At least two T-nuts with corresponding screws are generally necessary to securely fasten the riser to the substrate in a level manner. In a preferred embodiment, a T-nut with a corresponding screw is positioned approximately every ten inches along the sill assembly.

[0030] The slot 38 allows the T-nut 62 to be positioned anywhere along the length of the substrate 12. Similarly, the flanges 48, 50 permit lateral movement of the screw 70 along the length of the riser 16, although such movement does require some force due to the restriction of the extensions 52, 54, to allow the screw 70 to be positioned anywhere along the length of the riser. This feature allows the position of the T-nut and screw fastening assemblies to be varied along the length of the riser/substrate subassembly. This arrangement enhances the modularity of the sill assembly by permitting greater interchangeability of parts.

[0031] The sill 14 features a sloping top surface 74 having a number of ridges designed to enhance traction. On the underside of the sill 14 are located a front support 76 and a rear

support 78. Each of the supports 76, 78 is provided with a lateral extension 80, 82. The front extension 80 is arranged to engage the second sill groove 32 in the substrate, while the rear extension 82 engages the first sill groove 28 to connect the sill 14 with the substrate 12. The sill 14 also includes a sealing lip 84 which engages with the sealing leg 56 and extension 58 to form a weather seal. The remaining features of the sill 14 are generally known in the art and, therefore, will not be described in more detail.

[0032] The trim piece 18 is preferably made from a material similar to that used for the riser 16. Furthermore, both the riser 16 and trim piece 18 are provided with an identical finish in order to provide the sill assembly with aesthetically pleasing visible surfaces. The trim piece includes first and second connecting extensions 86, 88 which engage with the first and second trim grooves 34, 36 in the substrate, respectively, to secure the trim piece to the substrate.

[0033] It is envisioned that each of the primary pieces of the sill assembly, the substrate, riser, sill and trim piece, will form a modular system in which these pieces may be interchanged. The easy adaptability of the system will decrease manufacturing costs and the amount of inventory a manufacturer must carry. Furthermore, because the screws used in the assemblies are standard, the amount of custom hardware necessary to assemble the product is minimized.

[0034] Fig. 5 illustrates an embodiment of the sill assembly in a doorway having a door and a sidelight. The sill assembly 10 lies in a door frame (not shown in detail). A mullion 90 is positioned in the door frame between a door (not shown) and a sidelight 94. A riser 16 attached to a substrate (not shown), as described above, extends under the door between one outer jamb and the mullion 90. Between the mullion 90 and the other outer jamb, a sidelight adapter 96, or fixed sill, is attached to the substrate to provide a level surface for installing the sidelight 94. Like the other pieces of the system, the sidelight adapter 96 is intended to be extruded in a few standard lengths and cut to length at the installation site. A mullion adapter 98 is attached to the substrate between the riser 16

and the sidelight adapter 96 and provides a level surface for mounting the mullion 90. This eliminates the need to cut the profile of the sill assembly into the mullion 90.

[0035] The above components are also suitable for use in patio or french doors. These doorways usually include dual opposing doors separated by an astragal. One of the opposing doors is generally kept fixed most of the time and is referred to as the non-active door. The astragal may be attached to one of the opposing doors but is usually attached to the non-active door. In this arrangement, a fixed sill can be attached to the substrate underneath the non-active door and the astragal, while a riser 16 can be positioned underneath the operating door. The modular design of the sill assembly allows the riser 16 and fixed sill to be easily configured whether the non-active door is on the right or left side of the doorway.

[0036] Fig. 6 illustrates an alternate arrangement for supporting a riser 116 in a modular sill assembly. In the embodiment shown in Fig. 6, the remaining elements of the modular sill assembly are largely identical to the first embodiment shown in Figs. 1-4. The sill includes a substrate 112, a sill 114, and a trim piece 118. However, in the embodiment illustrated in Fig. 6, an adjusting screw 170 used to support the riser 116 is inverted relative to the arrangement shown in Figs. 1-4. This allows the head of the adjusting screw 170 to serve as a pedestal that rests on the top surface of the substrate 112. Alternately, the head 171 of the adjusting screw 170 may be inserted into the T-slot 138 of the substrate 112. A T-nut 162 is secured between first 148 and second 150 flanges of the riser 116. First 152 and second 154 extensions on the riser flanges engage the T-nut 162 to restrict both vertical and lateral movement of the nut. The first and second flanges 148, 150 and first and second extensions 152, 154 are spaced slightly wider than their counterparts in the embodiment shown in Figs. 1-4 to accommodate the slightly wider diameter of the T-nut 162. The T-nut 162 is threaded onto the adjusting screw 170. A pair of tracks 155, which extend along the length of the underside of the riser 116, engages the flange 164 of the T-nut 162 and hold it a slight distance from the underside

of the riser 116. By moving the T-nut 162 slightly away from the underside of the riser 116, the available room for raising the adjustment screw 170 is increased, thereby increasing the adjustment range of the system. In a preferred version of the embodiment, the adjusting screw 170 is provided with a slot (not shown) at the end opposite the head 171 and which faces upward. The slot allows easy adjustment of the riser height by turning the adjustment screw 170 and thereby moving the T-nut 162 upwards or downwards relative to the screw. Access holes (not shown) in the top of the riser 116 provide access to the adjusting screw 170.

[0037] Fig. 7 illustrates a slightly different version of the embodiment of Fig. 6. While the riser support arrangement is identical to that shown in Fig. 6, the substrate 212 of this embodiment is not provided with a T-slot. The T-slot is not required for the alternate riser support arrangement, and elimination of the slot reduces the overall cost of producing the substrate.

[0038] The embodiments illustrated in Figs. 6 and 7 include a sill sealing lip 184 provided with a ridge 185 running along the entire length of the sealing lip. The ridge 185 engages the sealing leg 156 and sealing extension 158 of the riser 116 to create an improved seal between the two pieces. A series of secondary ridges 187 are utilized on both sides of the sealing lip 184 to help secure the engagement of the sealing lip 184 and the sealing leg 156 regardless of the adjusted height of the riser 116.

[0039] In yet another alternate embodiment as shown in Fig. 8, the substrate 312 is provided with a hole 313 extending perpendicularly therethrough. The axis of the hole 313 is coextensive with the center of and communicates with T-slot 338. The remainder of the embodiment is similar to that illustrated in Fig. 6. The hole provides access to the head of the adjusting screw 170 from the underside of the substrate 312. This arrangement allows adjustment of the riser height without the need for access holes in the top surface of the riser when the threshold assembly is installed into a door frame prior to the frame being installed at the construction site, for example, in the case of pre-hung

door frames that are assembled at a factory prior to shipment to a distributor or directly to a construction site. Elimination of access holes in the top surface of the riser provides a more aesthetic assembly and also eliminates a possible entry point for moisture into the interior of the assembly. As with the embodiments shown in Figs. 6 and 7, this arrangement can also be provided without the T-slot 338.

[0040] Fig. 9 illustrates an alternate embodiment of the riser. In Fig. 9, adjusting screw 470 is provided with an oversized head 471. The oversized head 471 extends beyond the second leg 444 of the riser 416. In order to accommodate the oversized head 471, the first 442 and second 444 legs of the riser 416 are slightly shorter than those of the risers in the above-described embodiments. The legs of the riser 416 do not extend entirely to the top surface of the substrate, thereby leaving a gap between the bottom of the legs and the top of the riser. This gap accommodates the oversized head 471 of the adjusting screw 470 and allows the screw to extend beyond the legs. Alternatively, a slot is provided in the second leg 444 of the riser 416 to accommodate the oversized head 471. Depending on the configuration of the riser 416, a corresponding slot in the first leg 442 of the riser 416 may also be necessary to fully accommodate the oversized head 471. These arrangements allow direct manipulation of the oversized head 471 of the adjustment screw 470 and, consequently, adjustment of the riser height. The trim piece 418 is removed in order to gain access to the adjustment screw 470. The trim piece 418 may also be made from a flexible plastic material that will allow it to be partially pulled away from the riser to expose the oversized head 471 of the adjusting screw 470 without the need to remove the trim piece from the assembly. In this embodiment, access holes in the top surface of the riser are not necessary. This provides a smooth and unblemished top surface for the riser, which provides improved aesthetics for the assembly.

[0041] Other objects, features and advantages of the present invention will be apparent to those skilled in the art. While preferred embodiments of the present invention have been

illustrated and described, this has been by way of illustration and the invention should not be limited except as required by the scope of the appended claims and their equivalents.